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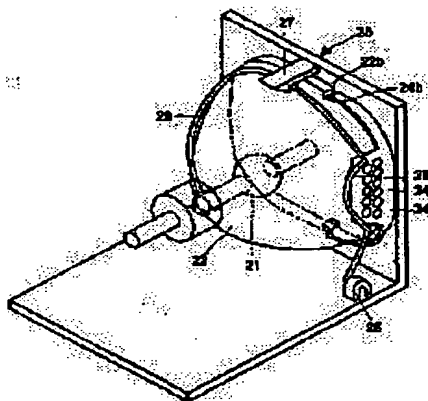
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(54) LIGHT SOURCE DEVICE, AND PROJECTION TYPE IMAGE DISPLAY DEVICE USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a light source device and a projection type image display device which prevent an excessive temperature rise while preventing a scattering of fragments caused by an explosion of a light emitting part.

SOLUTION: The light source device comprises a light emitting part 21, a parabolic surface reflection mirror 22 reflecting the light emitted from the light emitting part 21, and a transparent protection plate contacting with the front rim of the parabolic surface reflection mirror 22, formed so as to cover the reflection mirror. A notch is formed at the neighboring area of the front rim of the parabolic surface reflection mirror 22. By covering the notch with a scattering prevention plate 24 having a plurality of ventilation through holes 24a, an excessive temperature rise and a scattering of fragments caused by an explosion of a light emitting part 21, are prevented.



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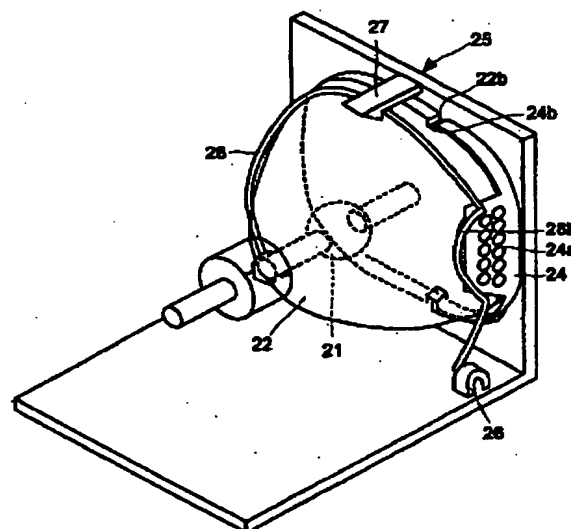
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(54) 【発明の名称】 光源装置及びこれを有した投写型映像表示装置

(57) 【要約】

【目的】 発光部の破裂による破片飛び散りを防止しつつ過度な温度上昇を防止できる光源装置及び投写型映像表示装置を提供する。

【構成】 光源装置は、発光部21と、この発光部21から出射された光を反射する放物面反射鏡22と、この放物面反射鏡22の前縁に接してこれを覆うように設けられた透明保護板とを備えて成る。放物面反射鏡22の前縁近傍には切欠が形成されている。この切欠を複数の通気貫通孔24aを有する飛散防止板24にて覆うことで、発光部21の破裂による破片飛び散りを防止しつつ過度な温度上昇を防止している。



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【特許請求の範囲】

【請求項1】 発光部と、前記発光部から出射された光を反射する曲面反射鏡と、前記曲面反射鏡の開口側を覆うように設けられた透明保護板と、を備えた光源装置において、曲面反射鏡に複数の通気貫通孔が形成されていることを特徴とする光源装置。

【請求項2】 発光部と、前記発光部から出射された光を反射する曲面反射鏡と、前記曲面反射鏡の開口側を覆うように設けられた透明保護板と、を備えた光源装置において、曲面反射鏡の前縁近傍に切欠が形成され、この切欠が複数の通気貫通孔を有する平板部材にて覆われていることを特徴とする光源装置。

【請求項3】 請求項2に記載の光源装置において、前記曲面反射鏡の前縁近傍には係止部が形成され、前記平板部材には前記係止部に係合する係止部が形成されており、前記平板部材は前記曲面反射鏡に係合装着されることを特徴とする光源装置。

【請求項4】 請求項2又は請求項3に記載の光源装置において、L字状板の一方の板面に前記曲面反射鏡からの出射光を透過させるための開口を有した支持台と、前記支持台の他方の板面に設けられた一对の係止穴部と、前記支持台の一方の板面に設けられた係止爪部と、前記一对の係止穴部に係合し且つ前記係止爪部にて係止されることで前記曲面反射鏡を支持台に固定すると共に前記平板部材を前記曲面反射鏡に圧接する線状弾性部材と、を備えたことを特徴とする光源装置。

【請求項5】 請求項1乃至請求項4のいずれかに記載の光源装置と、該光源装置から出射された光をライトバルブに導く光学系と、前記ライトバルブを経た光を投写する投写レンズと、前記光源装置の近傍に設けられた冷却ファン装置と、を備えたことを特徴とする投写型映像表示装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】この発明は、光源装置および投写型映像表示装置に関する。

【0002】

【従来の技術】液晶プロジェクタなどの投写型映像表示装置には、高輝度の光源装置が設けられている。この光源装置は発光部と曲面反射鏡（放物面反射鏡や楕円反射鏡）とから成り、前記発光部には、発光効率の観点などからメタルハライドランプに代表される放電管が使用されている。放電管は、その構造上、点灯中に破裂する可能性があるため、その対策として、図5に示すように、放物面反射鏡50の前縁に当接して固定されることによって放電管51の前方を覆う透明な保護板52を設けた構造が採用されており、点灯中に放電管51が破裂しても、その破片が周囲に飛び散らないようにしている。また、図6に示すように、放電管51を透明ガラス管53で覆った2重管構造も知られている。

【0003】

【発明が解決しようとする課題】しかしながら、上記従来の光源装置は、放電管51を完全に覆う構造であるため、放電管51から発せられた熱がこもり、温度が上昇して高温になり易い。また、特に図6に示した2重管構造の光源装置は割高であり、製作歩留りも悪いといった欠点を有している。

【0004】この発明は、上記の事情に鑑み、発光部の破裂による破片飛び散りを防止しつつ過度な温度上昇を防止できる光源装置及びこれを用いた投写型映像表示装置を提供することを目的とする。

【0005】

【課題を解決するための手段】この発明の光源装置は、上記の課題を解決するために、発光部と、前記発光部から出射された光を反射する曲面反射鏡と、前記曲面反射鏡の開口側を覆うように設けられた透明保護板と、を備えた光源装置において、曲面反射鏡に複数の通気貫通孔が形成されていることを特徴とする。

【0006】上記の構成においては、通気貫通孔によって光源装置内の高温空気は光源装置外の低温空気と入れ替わることが可能になり、光源装置の過度な温度上昇を抑えることができる。また、複数の通気貫通孔を備えるので、一つ一つの通気貫通孔を適当な小ささのものとし、万が一発光部が破裂した際の破裂片の飛び散りを防止することができる。

【0007】また、この発明の光源装置は、発光部と、前記発光部から出射された光を反射する曲面反射鏡と、前記曲面反射鏡の開口側を覆うように設けられた透明保護板と、を備えた光源装置において、曲面反射鏡の前縁近傍に切欠が形成され、この切欠が複数の通気貫通孔を有する平板部材にて覆われていることを特徴としている。

【0008】上記の構成においては、曲面反射鏡自体に複数の通気貫通孔を形成する場合の技術的困難性を解決しつつ、前述した作用を発揮することが可能となる。また、発光部において最良の発光状態を得るには発光部が最適な温度に維持されることが必要であり、冷却不足や過剰な冷却は避けるべきであるが、各機種で用いられる発光部や冷却ファンの能力や部材配置による冷却空気の流れなどが相違しており、各機種において最適な通気貫通孔の大きさや個数や配置なども違ってくることになる。曲面反射鏡の切欠を平板部材にて覆う当該構成においては、通気貫通孔の大きさや個数などを違えた複数種類の平板部材を用意することが容易であり、曲面反射鏡については共通品を用いつつ、前記冷却ファンの能力等を考慮して、適宜平板部材を選択することで、発光部における最良の発光状態を簡単に実現させることが可能となる。

【0009】前記曲面反射鏡の前縁近傍には係止部が形成され、前記平板部材には前記係止部に係合する係止部

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が形成されており、前記平板部材は前記曲面反射鏡に係合装着されるようにしてもよい。これによれば、ねじや接着剤などを用いずに平板部材を曲面反射鏡に装着することができる。また、光源装置の交換においては平板部材を再利用することが可能となる。

【0010】L字状板の一方の板面に前記曲面反射鏡からの出射光を透過させるための開口を有した支持台と、前記支持台の他方の板面に設けられた一对の係止穴部と、前記支持台の一方の板面に設けられた係止爪部と、前記一对の係止穴部に係合し且つ前記係止爪部にて係止されることで前記曲面反射鏡を支持台に固定すると共に前記平板部材を前記曲面反射鏡に圧接する線状弾性部材と、を備えてもよい。これによれば、ねじや接着剤などを用いずに曲面反射鏡を支持台に固定できると共に平板部材を曲面反射鏡に圧接できるので、特に平板部材が曲面反射鏡に係合装着される形態においては平板部材の離脱を確実に防止することが可能となる。

【0011】また、この発明の投写型映像表示装置は、上述したいずれかに記載の光源装置と、該光源装置から出射された光をライトバルブに導く光学系と、前記ライトバルブを経た光を投写する投写レンズと、前記光源装置の近傍に設けられた冷却ファン装置と、を備えたことを特徴とする。

【0012】

【発明の実施の形態】以下、この発明の実施形態の液晶プロジェクタを図1乃至図3に基づいて説明する。

【0013】図1はこの実施形態の液晶プロジェクタ1における内部構造の概略を示した断面図である。図では一つの液晶パネル2を備える一板式として示しているが、赤色光(R)用の液晶パネル、緑色光(G)用の液晶パネル、及び青色光(B)用の液晶パネルを備えた三板式の構成としてもよい。三板式の構成とする場合にはダイクロミックミラー、リレーレンズ、ダイクロミックプリズム等を用いた光学系を採用することができる。また、光源装置3を一つ備える構成としているが、複数備える構成としてもよい。

【0014】液晶プロジェクタ1の筐体1aの前面側には投写レンズ4が設けられている。光源装置3から出射された光は透過型の液晶パネル2にて光変調され、図示しない光学系を経て前記投写レンズ4に導かれ、この投写レンズ4にて図示しないスクリーンに映像が投影される。また、筐体1aの背面側には通気穴1bが形成されており、この通気穴1bに面した位置で且つ光源装置3の近傍位置に冷却ファン5を設けている。

【0015】図2は光源装置3を拡大して示した説明図である。光源装置3は、メタルハライドランプ等の放電管から成る発光部11と、この発光部11から出射された光が平行光となるように反射する放物面反射鏡12と、この放物面反射鏡の前縁に接してこれを覆うように設けられた透明保護板13とを備え成る。そして、前記

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放物面反射鏡12は、その名の如く放物線を回転させて得られる形状を有するのであるが、液晶パネル2は方形状に形成されており、必要な光照射面形状は方形状でよい。放物面反射鏡12の前縁近傍箇所において、液晶パネル2の方形状に対応させて平坦面部12aを4か所形成している。そして、この平坦面部12aの一つにおいて複数の通気貫通孔12bを形成している。

【0016】上記の通気貫通孔12bによって光源装置3内の高温空気は光源装置3外の低温空気と入れ替わることが可能になり、光源装置3の温度上昇を抑えることができる。また、複数の通気貫通孔12bを備えるので、一つ一つの通気貫通孔を適当な小ささのものとし、万が一発光部11が破裂した際の破裂片の飛び散りを防止している。実験では、通気と破裂片の飛び散り防止の観点から、通気貫通孔12bの直径を1.5mm~2.0mm程度とするのが適当であった。また、通気貫通孔12bは放物面反射鏡12における平坦面部12aに形成されているので、光反射の主要領域に及んで散在させて設けた場合の光反射効率低下といった不具合も防止できる。

【0017】図3及び図4は光源装置の他の例を示した斜視図である。この光源装置6は、メタルハライドランプ等の放電管から成る発光部21と、この発光部21から出射された光が平行光となるように反射する放物面反射鏡22と、この放物面反射鏡の前縁に接してこれを覆うように設けられた透明保護板23とを備える。放物面反射鏡22は、その前縁近傍に平坦面部を4か所所有し、この平坦面部の一つ(図では右箇所)において切欠22aを有している。この切欠22aは、複数の通気貫通孔24aが形成された飛散防止板(この実施形態では金属製としている)24によって覆われている。飛散防止板24を接着剤等によって放物面反射鏡22に装着してもよいのであるが、この実施形態では以下のようにして飛散防止板24を放物面反射鏡22に装着している。

【0018】飛散防止板24は前記通気貫通孔24aが形成された本体部と当該本体部から上下方向に各々延びた腕部とを有して成り、各腕部の先端を屈曲させて係止突起24bを形成している。一方、放物面反射鏡22の前縁上端および前縁下端には係止凹部22bが形成されている。係止凹部22bに係止突起24bに係合することで、飛散防止板24が放物面反射鏡22に係合装着される。

【0019】L字状板から成る支持台25は、一方の板面(立上板面)に放物面反射鏡22からの出射光を透過させるための開口25aを有する。支持台25の他方の板面には、一对の係止穴部26が放物面反射鏡22の横幅に略対応した間隔をおいて設けられている。また、支持台25の一方の板面(立上板面)の上部位置(開口25aよりも上の位置)には、係止爪部27が設けられている。係止爪部27は、他方の板面の側へ当該板面と略

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平行に突出して形成されており、その先端の下面側に爪部を有している。なお、この実施形態では、支持台25と一对の係止穴部26と係止爪部27とは樹脂成形によって一体成形されている。

【0020】係止爪部27は、線状弾性部材28を係止するように位置しているものであるが、線状弾性部材28における弾性力を受け止めるのではなく、当該弾性力は放物面反射鏡22に加わるようにしてある。放物面反射鏡22は前縁側ほど大径となるものであり、線状弾性部材28の弾性力が放物面反射鏡22に加わる状態では線状弾性部材28は小径側へとずれ動くとするが、このずれ動きを係止爪部27が阻止する。線状弾性部材28は、放物面反射鏡22の周囲形状に略対応した略Ω字形状を成しており、端部には前記一对の係止穴部26に係合することになる屈曲部28aを有している。この線状弾性部材28の屈曲部28aを係止穴部26にそれぞれ係合させ、線状弾性部材28の中央上部を前記係止爪部27に係止させることにより、放物面反射鏡22に下方向の弾性力が加わる。放物面反射鏡22は前縁側ほど大径となるものであるから、上記下方向の弾性力を受けることで、放物面反射鏡22を支持台25の一方の板面（立上板面）に圧接する力が生じるとともに、放物面反射鏡22を支持台25の他方の板面に圧接する力が生じることになる。これらの力によって放物面反射鏡22が支持台25に固定されることになる。

【0021】また、放物面反射鏡22における左右のずれ動きも略Ω字形状を成す線状弾性部材28によって阻止されることになる。線状弾性部材28には出っ張り部28bが形成されており、この出っ張り部28bが飛散防止板24上を通るようにしてある。従って、飛散防止板24が放物面反射鏡22の平坦面部に設けられていても、線状弾性部材28の弾性力が飛散防止板24に確実に付与され、飛散防止板24は放物面反射鏡22に押圧された状態でしっかりと保持されることになる。

【0022】このように、図3及び図4に示した構成は、通気貫通孔24aを有する飛散防止板24を用いるから、図2に示した放物面反射鏡12自体に通気貫通孔12bを形成する場合の技術的困難性を解決しつつ、図2の構成において奏する作用を同様に発揮することが可能となる。

【0023】ここで、発光部21（11）において最良の発光状態を得るには、発光部21（11）が最適な温度に維持されることが必要であり、冷却不足や過剰な冷却は避けるべきであるが、各機種で用いられる発光部21（11）や冷却ファン5の能力や部材配置による冷却空気の流路などが相違しており、各機種において最適な通気貫通孔24a（12b）の大きさや個数や配置なども違ってくることになる。通気貫通孔24aを有する飛散防止板24を用いる構成においては、通気貫通孔24aの個数や大きさ（孔の大きさの最大値は破片飛び散り

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防止の観点から決定するのが望ましい）や配置などを違えた複数種類の飛散防止板24を用意しておき、放物面反射鏡22については共通品を用いつつ、前記冷却ファン5の能力等を考慮して、適宜飛散防止板24を選択することで、発光部21における最良の発光状態を簡単に実現させることが可能となる。

【0024】また、放物面反射鏡22に係止凹部22bを形成してこれに飛散防止板24の係止突起24bに係合させるようにしたから、ねじや接着剤などを用いずに飛散防止板24を放物面反射鏡22に装着することができる。また、光源装置の交換においては飛散防止板24を再利用することが可能となる。勿論、係止凹部22bと係止突起24bとによる係合に限らず、係止凹部22bに代えて係止凸部とするなど、他の構成を採用することができる。また、放物面反射鏡22の切欠22aを飛散防止板24で覆うことを実現することにおいては、飛散防止板24を放物面反射鏡22に装着することの他、例えば、飛散防止板24を支持台25に取り付け、放物面反射鏡22を支持台25に装着することで切欠22aが飛散防止板24で覆われるとする構成も採用し得る。

【0025】また、線状弾性部材28によって放物面反射鏡22を支持台25に固定するようにしたから、固定用のねじや接着剤などを不要にできるとともに、線状弾性部材28の弾性力によって飛散防止板24が放物面反射鏡22から離脱してしまうのを確実に防止することができる。特に、線状弾性部材28に出っ張り部28bを設けたことで、放物面反射鏡22の平坦面部に設けた飛散防止板24を確実に押さえつけることができる。

【0026】なお、以上の説明においては、曲面反射鏡として放物面反射鏡12（22）を例示したが、楕円反射鏡としてもよい。また、飛散防止板24は金属に限らず、耐熱性の樹脂等を用いることができる。また、飛散防止板24を放物面反射鏡22の右横部に装着したが、切欠22aが左横部に存在する場合には当然に左横部に装着してもよく、両横部に切欠22aが存在する場合には、右横部或いは左横部の一方のみに装着して他方は完全に塞ぐようにしてもよいし、或いは両方に装着してもよい。また、切欠22aが上部に存在する場合には当然に上部に装着してもよい。また、切欠22aや通気貫通孔12bは放物面反射鏡22・12の平坦面部において形成し、光反射効率の低下を極力防止するようにしたが、必ずしも平坦面部に形成することに限定するものではない。また、通気貫通孔の形状を円形としたが、角形など他の形状としてもよい。また、透明保護板23を放物面反射鏡22に装着したが、透明保護板23を支持台25に装着する構造も採用し得る。また、当該光源装置を液晶プロジェクタに用いたが、他のライトバルブを用いる投写型映像表示装置にも用いることができる。

【0027】

【発明の効果】以上説明したように、この発明によれ

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ば、通気貫通孔によって光源装置内の高温空気を光源装置外の低温空気と入れ替え、光源装置の温度上昇を抑えることができる。また、複数の通気貫通孔を備えるので、一つ一つの通気貫通孔を適当な小ささのものとし、万が一発光部が破裂した際の破裂片の飛び散りを防止することができる。

【0028】曲面反射鏡に形成した切欠を複数の通気貫通孔を有する平板部材にて覆う構成であれば、曲面反射鏡自体に複数の通気貫通孔を形成する場合の技術的困難性を解決することができる。また、平板部材に形成する

通気貫通孔の数や大きさ等を変えることで発光部に対する冷却能力を調整でき、発光部において最良の温度を確保することが可能となる。

【0029】平板部材を曲面反射鏡に係合装着する構成であれば、ねじや接着剤などを用いずに平板部材を曲面反射鏡に装着することができる。また、光源装置の交換

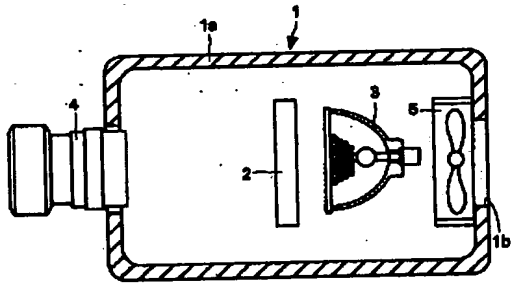
においては平板部材を再利用することが可能となる。

【0030】線状弾性部材を用いて曲面反射鏡に支持台に装着する構成であれば、ねじや接着剤などを用いずに曲面反射鏡を支持台に固定できると共に平板部材は曲面反射鏡に圧接されるので、特に平板部材が曲面反射鏡に係合装着される形態においては平板部材の離脱を確実に防止することが可能となる。

【図面の簡単な説明】

【図1】この発明の実施形態の液晶プロジェクタの概略

【図1】



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構成を示した断面図である。

【図2】図1に示した光源装置の拡大図である。

【図3】この発明の実施形態の光源装置の斜視図である。

【図4】この発明の実施形態の光源装置の分解斜視図である。

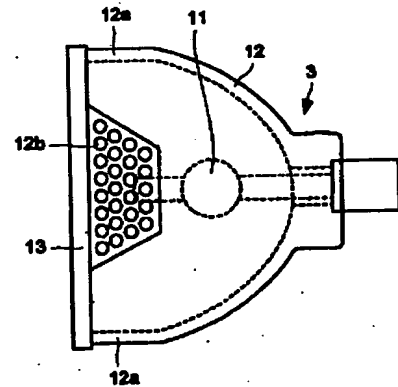
【図5】従来の光源装置を示した断面図である。

【図6】従来の光源装置（2重管構造）を示した断面図である。

【符号の説明】

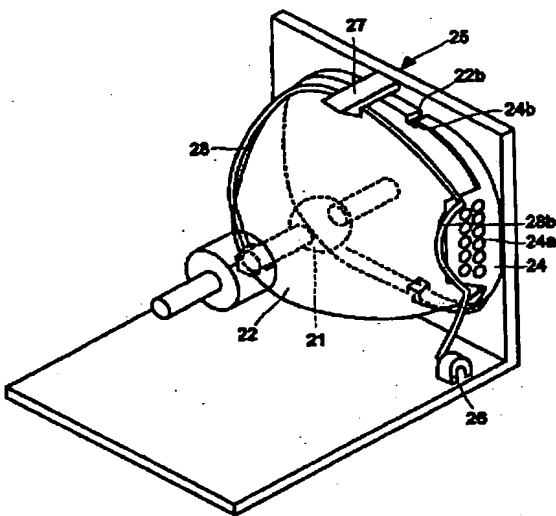
- 1 液晶プロジェクタ
- 2 液晶パネル
- 3 光源装置
- 4 投写レンズ
- 5 冷却ファン装置
- 11, 21 発光部
- 12, 22 放物面反射鏡
- 13, 23 透明保護板
- 12b, 24a 通気貫通孔
- 24a 通気貫通孔
- 25 支持台
- 26 係止穴部
- 27 係止爪部
- 28 線状弾性部材

【図2】

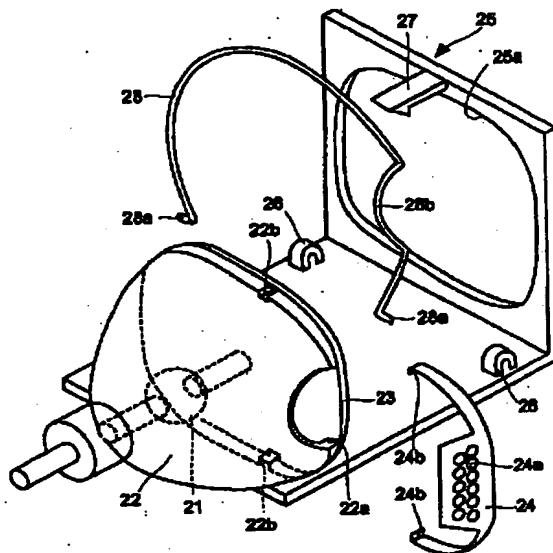


(6)

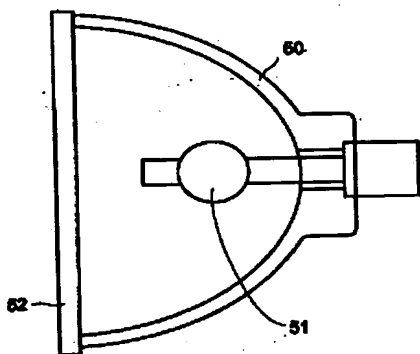
【図3】



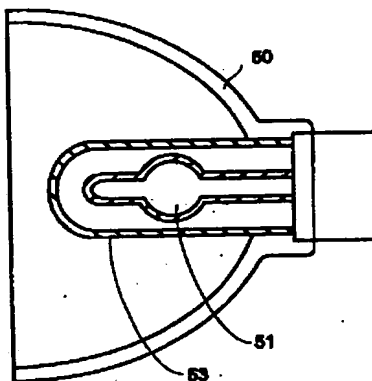
【図4】



【図5】



【図6】



フロントページの続き

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CC10

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CLAIMS

[Claim(s)]

[Claim 1] Light equipment characterized by forming two or more aeration through tubes in a curved-surface reflecting mirror in light equipment equipped with the light-emitting part, the curved-surface reflecting mirror which reflects the light by which outgoing radiation was carried out from said light-emitting part, and the transparency guard plate formed so that the opening side of said curved-surface reflecting mirror might be covered.

[Claim 2] Light equipment characterized by being covered in the monotonous member in which notching is formed in near the first transition of a curved-surface reflecting mirror, and this notching has two or more aeration through tubes in light equipment equipped with the light-emitting part, the curved-surface reflecting mirror which reflects the light by which outgoing radiation was carried out from said light-emitting part, and the transparency guard plate formed so that the opening side of said curved-surface reflecting mirror might be covered.

[Claim 3] It is light equipment which the stop section is formed near the first transition of said curved-surface reflecting mirror, and the stop section which engages with said stop section is formed in said monotonous member in light equipment according to claim 2, and is characterized by carrying out engagement wearing of said monotonous member at said curved-surface reflecting mirror.

[Claim 4] Susceptor with opening for making one plate surface of a L character-like plate penetrate the outgoing radiation light from said curved-surface reflecting mirror in light equipment according to claim 2 or 3, The stop hole of the pair prepared in the plate surface of another side of said susceptor, and the stop claw part prepared in one plate surface of said susceptor, the line which carries out the pressure welding of said monotonous member to said curved-surface reflecting mirror while fixing said curved-surface reflecting mirror to susceptor by engaging with the stop hole of said pair, and being stopped in said stop claw part -- the light equipment characterized by having an elastic member.

[Claim 5] The projection mold graphic display device characterized by having light equipment according to claim 1 to 4, the optical system which leads the light by which outgoing radiation was carried out from this light equipment to a light valve, the projection lens which projects the light which passed through said light valve, and cooling-fan equipment formed near said light equipment.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to light equipment and a projection mold graphic display device.

[0002]

[Description of the Prior Art] The light equipment of high brightness is formed in projection mold graphic display devices, such as a liquid crystal projector. This light equipment consists of a light-emitting part and a curved-surface reflecting mirror (a parabolic reflector and ellipse reflecting mirror), and the discharge tube represented by the metal halide lamp from a viewpoint of luminous efficiency etc. is used for said light-emitting part. Even if the structure which formed the transparent guard plate 52 which covers the front of the discharge tube 51 by being fixed in contact with the first transition of a parabolic reflector 50 is adopted and the discharge tube 51 explodes during lighting as the case shown in drawing 5 since the discharge tube may explode on the structure and during lighting, he is trying for the fragment not to scatter around. Moreover, as shown in drawing 6, the double tubing structure which covered the discharge tube 51 with the transparency glass tube 53 is also known.

[0003]

[Problem(s) to be Solved by the Invention] However, about the discharge tube 51, since the above-mentioned conventional light equipment is completely wrap structure, it is filled with the heat emitted from the discharge tube 51, temperature rises, and it tends to become an elevated temperature. Moreover, the light equipment of the double tubing structure shown especially in drawing 6 is comparatively high-priced, and it has the fault that the manufacture yield is also bad.

[0004] This invention aims at offering the light equipment which can prevent too much temperature rise, and the projection mold graphic display device using this in view of the above-mentioned situation, preventing fragment spilling by the burst of a light-emitting part.

[0005]

[Means for Solving the Problem] The light equipment of this invention is characterized by forming two or more aeration through tubes in a curved-surface reflecting mirror in light equipment equipped with the light-emitting part, the curved-surface reflecting mirror which reflects the light by which outgoing radiation was carried out from said light-emitting part, and the transparency guard plate formed so that the opening side of said curved-surface reflecting mirror might be covered, in order to solve the above-mentioned technical problem.

[0006] In the above-mentioned configuration, by the aeration through tube, it becomes possible to replace the low-temperature air besides light equipment, and the elevated-temperature air in light equipment can suppress too much temperature rise of light equipment. Moreover, since it has two or more aeration through tubes, each aeration through tube can be made into the thing of suitable smallness, and spilling of the piece of a burst at the time of a light-emitting part exploding can be prevented.

[0007] Moreover, in light equipment equipped with the light-emitting part, the curved-surface reflecting

mirror which reflects the light by which outgoing radiation was carried out from said light-emitting part, and the transparence guard plate formed so that the opening side of said curved-surface reflecting mirror might be covered, notching is formed near the first transition of a curved-surface reflecting mirror, and the light equipment of this invention is characterized by being covered in the monotonous member in which this notching has two or more aeration through tubes.

[0008] In the above-mentioned configuration, it becomes possible to demonstrate the operation mentioned above, solving the technical difficulty in the case of forming two or more aeration through tubes in the curved-surface reflecting mirror itself. Moreover, although it is required for acquiring the best luminescence condition in a light-emitting part for a light-emitting part to be maintained by the optimal temperature and the lack of cooling and superfluous cooling should be avoided, the light-emitting part used from each model, the capacity of a cooling fan, the passage of the cooling air by member arrangement, etc. will be different, and arrangement etc. will differ from the magnitude and the number of the optimal aeration through tube in each model. Notching of a curved-surface reflecting mirror is set in this wrap this configuration in a monotonous member. It is easy to prepare two or more kinds of monotonous members which changed magnitude, the number, etc. of an aeration through tube, and it is choosing a monotonous member suitably in consideration of the capacity of said cooling fan etc., using a common article about a curved-surface reflecting mirror. It becomes possible to realize simply the best luminescence condition in a light-emitting part.

[0009] The stop section is formed near the first transition of said curved-surface reflecting mirror, the stop section which engages with said stop section is formed in said monotonous member, and engagement wearing of said monotonous member may be made to be carried out at said curved-surface reflecting mirror. According to this, a curved-surface reflecting mirror can be equipped with a monotonous member, without using ****, adhesives, etc. Moreover, it becomes possible to reuse a monotonous member in exchange of light equipment.

[0010] Susceptor with opening for making one plate surface of a L character-like plate penetrate the outgoing radiation light from said curved-surface reflecting mirror, The stop hole of the pair prepared in the plate surface of another side of said susceptor, and the stop claw part prepared in one plate surface of said susceptor, the line which carries out the pressure welding of said monotonous member to said curved-surface reflecting mirror while fixing said curved-surface reflecting mirror to susceptor by engaging with the stop hole of said pair, and being stopped in said stop claw part -- you may have an elastic member. Since according to this the pressure welding of the monotonous member can be carried out to a curved-surface reflecting mirror while being able to fix a curved-surface reflecting mirror to susceptor, without using ****, adhesives, etc., especially a monotonous member becomes possible [preventing balking of a monotonous member certainly in the gestalt by which engagement wearing is carried out to a curved-surface reflecting mirror].

[0011] Moreover, the projection mold graphic display device of this invention is characterized by having the optical system which leads the light by which outgoing radiation was carried out to either which was mentioned above from the light equipment and this light equipment of a publication to a light valve, the projection lens which projects the light which passed through said light valve, and cooling-fan equipment formed near said light equipment.

[0012]

[Embodiment of the Invention] Hereafter, the liquid crystal projector of the operation gestalt of this invention is explained based on drawing 1 thru/or drawing 3 .

[0013] Drawing 1 is the sectional view having shown the outline of the internal structure in the liquid crystal projector 1 of this operation gestalt. Although shown as a 1 plate type equipped with one liquid crystal panel 2 by a diagram, it is good also as a configuration of the 3 plate type equipped with the liquid crystal panel for red light (R), and the liquid crystal panel the liquid crystal panel of **, and for (green light G) blue glow (B). When considering as the configuration of a 3 plate type, the optical system which used the dichroic mirror, the relay lens, the dichroic prism, etc. can be adopted. Moreover, although considered as the configuration equipped with one light equipment 3, it is good also as a configuration which it has.

[0014] The projection lens 4 is formed in the front-face side of case 1a of a liquid crystal projector 1. Light modulation of the light by which outgoing radiation was carried out from light equipment 3 is carried out with the liquid crystal panel 2 of a transparency mold, it is led to said projection lens 4 through the optical system which is not illustrated, and an image is projected on the screen which is not illustrated with this projection lens 4. Moreover, vent hole 1b is formed in the tooth-back side of case 1a, it is a location facing this vent hole 1b, and the cooling fan 5 is formed in the near location of light equipment 3.

[0015] Drawing 2 is the explanatory view having expanded and shown light equipment 3. Light equipment 3 is equipped with the light-emitting part 11 which consists of the discharge tubes, such as a metal halide lamp, the parabolic reflector 12 reflected so that the light by which outgoing radiation was carried out may turn into parallel light from this light-emitting part 11, and the transparency guard plate 13 formed so that this might be covered in contact with the first transition of this parabolic reflector, and changes. And although said parabolic reflector 12 has the configuration which is made to rotate a parabola and is acquired like the name, the liquid crystal panel 2 is formed in the shape of a rectangle, and since a rectangle-like is sufficient as a required optical exposure side configuration, in the part near the first transition of a parabolic reflector 12, it is made to correspond in the shape of [of a liquid crystal panel 2] a rectangle, and forms four flat surface part 12a. And in one of the flat surface part 12a of this, two or more aeration through tube 12b is formed.

[0016] By the above-mentioned aeration through tube 12b, it becomes possible to replace the low-temperature air besides light equipment 3, and the elevated-temperature air in light equipment 3 can suppress the temperature rise of light equipment 3. Moreover, since it has two or more aeration through tube 12b, each aeration through tube was made into the thing of suitable smallness, and spilling of the piece of a burst at the time of a light-emitting part 11 exploding has been prevented. It was appropriate to have set the diameter of aeration through tube 12b to 1.5mm - about 2.0mm from a viewpoint of aeration and spilling prevention of the piece of a burst in an experiment. Moreover, since aeration through tube 12b is formed in flat surface part 12a in a parabolic reflector 12, the fault of the light reflex degradation at the time of reaching the main fields of a light reflex, making them scattered, and preparing in them can also be prevented.

[0017] Drawing 3 and drawing 4 are the perspective views having shown other examples of light equipment. This light equipment 6 is equipped with the light-emitting part 21 which consists of the discharge tubes, such as a metal halide lamp, the parabolic reflector 22 reflected so that the light by which outgoing radiation was carried out may turn into parallel light from this light-emitting part 21, and the transparency guard plate 23 formed so that this might be covered in contact with the first transition of this parabolic reflector. A parabolic reflector 22 has four flat surface parts near [that] the first transition, and has notching 22a in one of the flat surface part of this (drawing right part). This notching 22a is covered with the scattering prevention plate (with this operation gestalt, it is considering as metal) 24 with which two or more aeration through tube 24a was formed. Although a parabolic reflector 22 may be equipped with the scattering prevention plate 24 with adhesives etc., as it is the following, the parabolic reflector 22 is equipped with the scattering prevention plate 24 with this operation gestalt.

[0018] The scattering prevention plate 24 has the arm prolonged respectively in the vertical direction, changes from the body section in which said aeration through tube 24a was formed, and the body section concerned to it, makes the tip of each arm crooked, and forms stop projection 24b. On the other hand, stop crevice 22b is formed in the first transition upper limit and first transition lower limit of a parabolic reflector 22. Engagement wearing of the scattering prevention plate 24 is carried out at a parabolic reflector 22 because stop projection 24b engages with stop crevice 22b.

[0019] The susceptor 25 which consists of a L character-like plate has opening 25a for making one plate surface (** top plate surface) penetrate the outgoing radiation light from a parabolic reflector 22. The stop hole 26 of a pair sets spacing which carried out abbreviation correspondence to the breadth of a parabolic reflector 22, and is prepared in the plate surface of another side of susceptor 25 at it. Moreover, the stop claw part 27 is formed in the up location (location above opening 25a) of one plate

surface (** top plate surface) of susceptor 25. The stop claw part 27 is projected and formed in the plate surface concerned and abbreviation parallel to the plate surface side of another side, and has the claw part in the inferior-surface-of-tongue side at the tip. In addition, susceptor 25, the stop hole 26 of a pair, and the stop claw part 27 are really fabricated with this operation gestalt by resin shaping.

[0020] the stop claw part 27 -- a line -- although it is what is located so that an elastic member 28 may be stopped -- a line -- it does not respond to the elastic force in an elastic member 28, but is made for the elastic force concerned to have joined the parabolic reflector 22 that from which a parabolic reflector 22 serves as a major diameter like a first transition side -- it is -- a line -- the condition that the elastic force of an elastic member 28 joins a parabolic reflector 22 -- a line -- although an elastic member 28 shifts to a minor diameter side and it is going to move, the stop claw part 27 prevents this gap motion. a line -- the elastic member 28 has constituted the shape of an abbreviation omega typeface which carried out abbreviation correspondence in the perimeter configuration of a parabolic reflector 22, and has in the edge flection 28a which will engage with the stop hole 26 of said pair. this line -- flection 28a of an elastic member 28 is engaged with the stop hole 26, respectively -- making -- a line -- down elastic force joins a parabolic reflector 22 by making said stop claw part 27 stop the central upper part of an elastic member 28. Since it serves as a major diameter like a first transition side, a parabolic reflector 22 is receiving elastic force down [above-mentioned], and while the force which carries out the pressure welding of the parabolic reflector 22 to one plate surface (** top plate surface) of susceptor 25 arises, the force which carries out the pressure welding of the parabolic reflector 22 to the plate surface of another side of susceptor 25 will produce it. A parabolic reflector 22 will be fixed to susceptor 25 by these force.

[0021] moreover, the line to which the gap movement toward the right and left in a parabolic reflector 22 also constitutes the shape of an abbreviation omega typeface -- it will be prevented by the elastic member 28. a line -- it protrudes in an elastic member 28, section 28b is formed, and this lug section 28b has passed along the scattering prevention plate 24 top. therefore -- even if the scattering prevention plate 24 is formed in the flat surface part of a parabolic reflector 22 -- a line -- the elastic force of an elastic member 28 will be certainly given to the scattering prevention plate 24, and the scattering prevention plate 24 will be firmly held, after having been pressed by the parabolic reflector 22.

[0022] Thus, it becomes possible [demonstrating similarly the operation which does so in the configuration of drawing 2], solving the technical difficulty in the case of forming aeration through tube 12b in parabolic-reflector 12 the very thing shown in drawing 2 , since the configuration shown in drawing 3 and drawing 4 uses the scattering prevention plate 24 which has aeration through tube 24a.

[0023] Although it is required for a light-emitting part 21 (11) to be maintained by the optimal temperature in order to acquire the best luminescence condition in a light-emitting part 21 (11) here and the lack of cooling and superfluous cooling should be avoided The light-emitting part 21 (11) used from each model, the capacity of a cooling fan 5, the passage of the cooling air by member arrangement, etc. will be different, and arrangement etc. will differ from the magnitude and the number of optimal aeration through tube 24a (12b) in each model. In the configuration using the scattering prevention plate 24 which has aeration through tube 24a Preparing two or more kinds of scattering prevention plates 24 which changed the number and magnitude (determining from a viewpoint of fragment spilling prevention is desirable as for the maximum of the magnitude of a hole) of aeration through tube 24a, arrangement, etc., and using a common article about a parabolic reflector 22 It becomes possible to realize simply the best luminescence condition in a light-emitting part 21 by choosing the scattering prevention plate 24 suitably in consideration of the capacity of said cooling fan 5 etc.

[0024] Moreover, since it was made to make stop projection 24b of the scattering prevention plate 24 engage with stop crevice 22b being formed in a parabolic reflector 22, a parabolic reflector 22 can be equipped with the scattering prevention plate 24, without using ****, adhesives, etc. Moreover, it becomes possible to reuse the scattering prevention plate 24 in exchange of light equipment. Of course, not only the engagement by stop crevice 22b and stop projection 24b but other configurations, such as replacing with stop crevice 22b and considering as stop heights, are employable. Moreover, in realizing covering notching 22a of a parabolic reflector 22 with the scattering prevention plate 24, other, for

example, scattering, prevention plate [equip / with the scattering prevention plate 24 / a parabolic reflector 22] 24 is attached in susceptor 25, and the configuration to which it is supposed that notching 22a is covered with the scattering prevention plate 24 by equipping susceptor 25 with a parabolic reflector 22 can also be adopted.

[0025] moreover, a line -- since the parabolic reflector 22 was fixed to susceptor 25 by the elastic member 28, while being able to make **** for immobilization, adhesives, etc. unnecessary -- a line -- the scattering prevention plate 24 can prevent seceding from a parabolic reflector 22 certainly according to the elastic force of an elastic member 28. especially -- a line -- the scattering prevention plate 24 formed in the flat surface part of a parabolic reflector 22 can be certainly pressed down by having protruded in the elastic member 28 and having prepared section 28b.

[0026] In addition, in the above explanation, although the parabolic reflector 12 (22) was illustrated as a curved-surface reflecting mirror, it is good also as an ellipse reflecting mirror. Moreover, the scattering prevention plate 24 can use not only a metal but heat-resistant resin etc. Moreover, although the right section of a parabolic reflector 22 was equipped with the scattering prevention plate 24, when the left section may naturally be equipped when notching 22a exists in the left section, and notching 22a exists in both transverse part, either the right section or the left section is equipped, you may make it take up another side completely, or both may be equipped with it. Moreover, when notching 22a exists in the upper part, naturally the upper part may be equipped. Moreover, although notching 22a and aeration through tube 12b are formed in the flat surface part of a parabolic reflector 22-12 and decline in light reflex effectiveness was prevented as much as possible, it does not necessarily limit to forming in a flat surface part. Moreover, although the configuration of an aeration through tube was made circular, it is good also as other configurations, such as a square shape. Moreover, although the parabolic reflector 22 was equipped with the transparence guard plate 23, the structure of equipping susceptor 25 with the transparence guard plate 23 can also be adopted. Moreover, although the light equipment concerned was used for the liquid crystal projector, it can use also for the projection mold graphic display device using other light valves.

[0027]

[Effect of the Invention] As explained above, according to this invention, by the aeration through tube, the elevated-temperature air in light equipment can be freshened with the low-temperature air besides light equipment, and the temperature rise of light equipment can be suppressed. Moreover, since it has two or more aeration through tubes, each aeration through tube can be made into the thing of suitable smallness, and spilling of the piece of a burst at the time of a light-emitting part exploding can be prevented.

[0028] In the monotonous member which has two or more aeration through tubes for notching formed in the curved-surface reflecting mirror, if it is a wrap configuration, the technical difficulty in the case of forming two or more aeration through tubes in the curved-surface reflecting mirror itself is solvable. Moreover, the refrigeration capacity to a light-emitting part can be adjusted by changing a number, magnitude, etc. of the aeration through tube formed in a monotonous member, and it becomes possible to secure the best temperature in a light-emitting part.

[0029] If it is the configuration which carries out engagement wearing of the monotonous member at a curved-surface reflecting mirror, a curved-surface reflecting mirror can be equipped with a monotonous member, without using ****, adhesives, etc. Moreover, it becomes possible to reuse a monotonous member in exchange of light equipment.

[0030] a line -- since the pressure welding of the monotonous member will be carried out to a curved-surface reflecting mirror while being able to fix a curved-surface reflecting mirror to susceptor, without using ****, adhesives, etc. if it is the configuration with which a curved-surface reflecting mirror is equipped at susceptor using an elastic member, especially a monotonous member becomes possible [preventing balking of a monotonous member certainly in the gestalt by which engagement wearing is carried out to a curved-surface reflecting mirror].

[Translation done.]

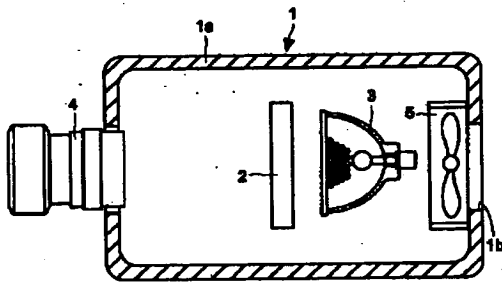
* NOTICES *

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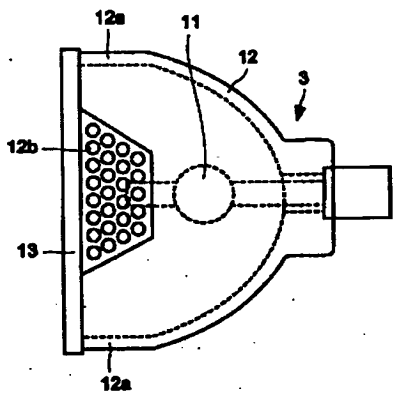
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2. **** shows the word which can not be translated.
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DRAWINGS

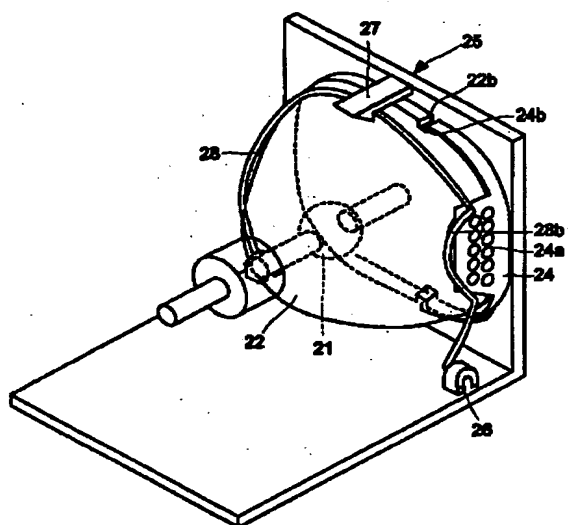
[Drawing 1]



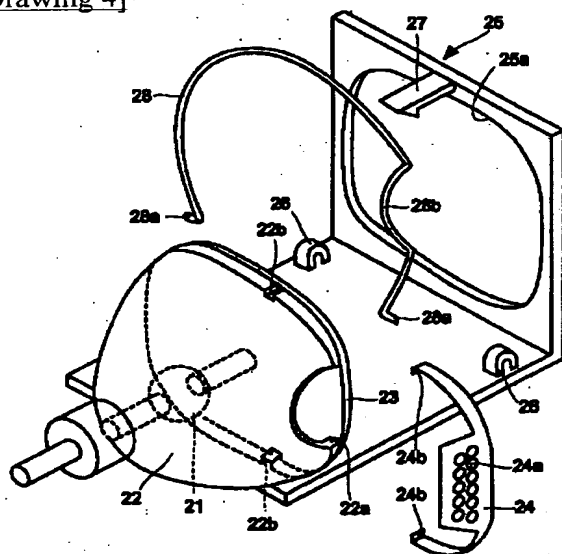
[Drawing 2]



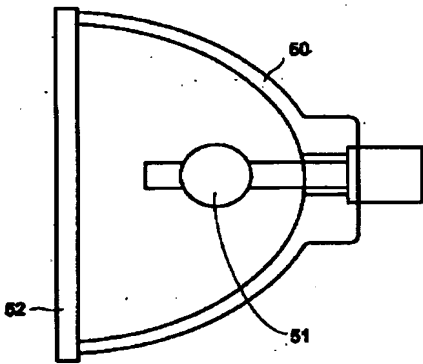
[Drawing 3]



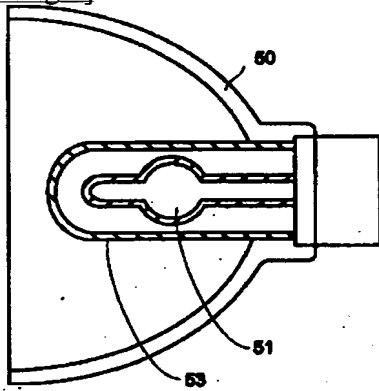
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]